Department of **Employment, Economic Development and Innovation**

2011 Level 1
Mine Emergency Exercise

Aquila Coal Mine—Tuesday 18 October 2011

Queensland Government

Photography

Cover and internal images – Courtesy of Mines Inspectorate, Commission of Mine Safety and Health

Recognised Standard 8 — Conduct of Mine Emergency Exercises — calls for the outcomes and learnings of these exercises to be shared with industry. Accordingly, this report is a record of the Level 1 (State) Mine Emergency Exercise conducted at Aquila Mine–Anglo American, Tuesday 18 October 2011.

View of portals from highwall at Aquila Mine

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Contents

Acknowledgments

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The committee also thanks the assessors for their input, and acknowledges the cooperation and assistance from other mining operations and external agencies.

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- Stephen Tonegato, NSW Mines Rescue
- Ruth Fuller, PhD student, Minerals Industry Safety and Health Centre, the University of Queensland
- Tony Bennett, Senior Mining Research and Design Technician, Simtars, who developed physical representations and models to support the scenario.

A number of mines allowed senior staff to take part as assessors, which involved committing to several days away from their own mine. The committee thanks each of the mining companies for their support and recognises the contribution of the assessors. In addition to the committee members and the specialists listed above, the assessors were:

- Tony Caffery, Anglo American Metallurgical Coal (Grasstree Mine)
- Richard Whatman, BMA (Broadmeadow Mine)
- Helen Vardenaga, Anglo American Metallurgical Coal (Capcoal Surface Mine)
- Nathan Fletcher, Anglo American Metallurgical Coal (Capcoal Surface Mine)
- Jason Hill, Xstrata Coal (Oaky North Mine)
- Steve Dawe, Xstrata Coal (Oaky North Mine)

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Abbreviations and definitions

ACRO	Assistant Control Room Officer
activation	The effective notification to each person of matters affecting a person's safety and health, including emergencies and the location of known hazards.
aided escape	An escape in which persons on the surface of a coal mine help workers trapped underground.
assisted evacuation	An emergency response that requires a mine to access external aid.
change over	The process of donning a fresh rescuer and removing a spent rescuer.
CO	carbon monoxide
COB	A **change-over base** is a facility designed to protect people from the outside atmosphere. It is equipped with first-aid equipment, compressed air lines, drinking water, communications, recording equipment, mine workings and evacuation plans, and gas-detecting equipment.
control room	A designated area from which a mine's operations are coordinated. Functions of a control room include: • monitoring communications • monitoring the main fan, the main return air stream and other mine atmospheric systems • monitoring and tracking the location and circumstances of persons underground • identification of missing persons • providing plans • monitoring and recording the progress of an emergency through an event log.
CMW	coal mineworker
CRO	**Control Room Officer** or **Control Room Operator** is the person in the control room at all times while the mine is operating. A CRO would normally take the first report of an emergency and initiate a call for extra resources.
emergency	An actual or imminent occurrence (such as fire, flood, storm, earthquake, explosion, terrorist act, accident, epidemic or warlike action) that: • endangers, or threatens to endanger, the safety or health of persons, or • destroys or damages, or threatens to destroy or damage, property, and • requires a significant and coordinated response.
emergency response capability	Ability to demonstrate that the mine is capable of achieving the objectives of the plan.
evacuation	Withdrawal to a place of safety of persons exposed to danger.
FARP	A **first-action response plan** is the initial action taken by personnel on hand, with the equipment available to them, to control or contain an unwanted event. The unwanted event is, or has the potential to cause, a condition of danger. The first response can be enacted at any level as long as the personnel are confident of assessing the situation, identifying hazards, have suitable equipment on hand, know their limitations, communicate remedial action, conduct remedial action, and recognise evolving risk and the need to withdraw.
ICS	The **incident control system** is the system for emergency management focused on management by objective in four functional areas: control, planning, operations, and logistics.
IMT	An **incident management team** is a group of persons with authority defined by a PHMP to initiate actions to ensure the safety of mine personnel and to help manage an emergency. The IMT is made up of representatives from planning, operations and logistics groups.
inbye	Direction towards the coal face from any point of reference: *I walked inbye from the portal to pit bottom*.
incident management	The processes and systems used to plan, organise, lead and control coal-mining operations during an emergency.
in-seam response	Team from an unaffected area of the mine that renders assistance to, or responds to, an underground incident.
MEMS	The **Mine Emergency Management System** is a system developed by the QMRS for managing emergency incidents at coal mines in Queensland.
non-verbal communication	Non-verbal communication refers to any communication not involving speech. The non-verbal protocols for DACs, phones and the like are: 3 beeps/taps for 'yes'; 2 beeps/ taps for 'no'.
OCE	The **Open Cut Examiner** is a statutory role under the Queensland Coal Mining Safety and Health Act.
outbye	Direction away from the coal face from any point of reference: *I headed outbye from pit bottom to the surface via the drift*.

PHMP	A **Principal Hazard Management Plan** is a management plan developed through the process of risk assessment aimed at ensuring that indicators of principal hazards are identified, monitored and appropriately responded to in a coordinated and orderly way.
place of safety	A designated place where persons will assemble without being in any danger from the hazard that triggered the evacuation. The place of safety: • must reflect the consequence of the hazard that has initiated the evacuation • must have an effective means of communication with the surface control • may include, but is not limited to, the following locations: – panel crib room – main headings opposite a district ventilation split – pit bottom or the base of intake shaft or drift – refuge chambers/change-over bases – surface location.
portal security	Portal security is established to control entry to and exit from the mine.
principal hazard	A principal hazard at a coal mine is a hazard with the potential to cause multiple fatalities.
QAS	Queensland Ambulance Service
QMRS	Queensland Mines Rescue Service
response	Response may include: • aided or self-escape from a mine in an emergency • prompt summoning of assistance, including communicating with, and receiving assistance from, external entities • taking remedial action, including withdrawing persons in danger and taking other reasonable and necessary action to ensure no-one is exposed to an unacceptable level of risk • protocols for taking action in life-threatening situations.
SCBA or SCSR	A **self-contained breathing apparatus** or **self-contained self-rescuer** is a portable respirator that supplies oxygen, air or other respirable gas from a source carried by the user.
self-escape	The process of a person or persons escaping from a mine in an emergency without direct assistance from surface personnel.
self-reliant	Services, personnel or infrastructure provided and available at the mine site capable of responding to an emergency.
SOP	A **standard operating procedure** is a written instruction detailing all steps and activities of a process or procedure. A SOP at a coal mine is a documented way of working or an arrangement of facilities to achieve an acceptable level of risk, developed after consultation with coal mineworkers.
SSE	The **Site Senior Executive** is the most senior person at a mine.
stakeholder	Any party with an interest in, or an obligation to, the safe operation of the mine.
surface control	A competent person on the surface with the authority to initiate and monitor withdrawal of persons to a place of safety.
TARP	A **trigger-action response plan** consists of elements or sub-elements of a PHMP that are predetermined actions tied to specific trigger levels or events.
timely communication	The mine must be able to assemble a communication system, in a timely manner, at an incident control centre to coordinate required communication between various parts of the mine and with external agencies. The aim is to guarantee external communication capability.
training needs analysis	This term is explained in Recognised Standard 11 'Training in Coal Mines' (page 3) as follows: **Establishing training needs and pathways** To ensure all persons working at a coal mine have the appropriate skills, knowledge and competencies to fulfil their position/role, all competencies: • as prescribed under legislation (statutory) • determined by the Coal Mining Safety and Health Advisory Committee • contained within site standards or the site's safety and health management system, and/or • otherwise determined through risk management, change management or other site processes shall be included in a training needs analysis A training needs analysis will identify the skills needed, the skills held and the training gap for each individual against their position requirements. When an employee commences with the site, this analysis is to be undertaken to establish a training plan in line with the requirements.
trigger level	A condition or event that is not the normal, is able to be measured or observed, and, on being reached, requires initiation of predetermined actions. Triggers are developed in consultation with affected CMWs.
UMM	Underground Mine Manager
WOP	**Withdrawal of persons** refers to the organised evacuation of persons from the mine or part of the mine to a designated place of safety when the risk to life or health has exceeded predetermined trigger levels.

Summary

The 2011 Level 1 Mine Emergency Exercise was held at Aquila underground coal mine on Tuesday 18 October, between mid-morning and 1600 hours. The Aquila Mine is 35 km south-west of Middlemount, in Central Queensland.

Scope

The exercise planned to test the Aquila Mine Emergency Evacuation Plan and the Aquila Mine Emergency Management Plan, focusing on internal and external resourcing and the incident control system, and other related matters. The following categories of the plan were tested:

Activation—informing relevant people of the situation

Evacuation—arranging for those at risk to move to a safe place

Response—taking remedial action

Incident management—the processes and systems used to deal with the event.

Scenario

The scenario was that three members of a production crew were trapped inbye of a roof-fall. One of the miners was seriously injured so a medical emergency also existed.

In addition to the roof-fall, mineworkers had to contend with the failure of the main fan (45 minutes after the roof-fall) and a surface grass fire (60 minutes after the roof-fall), which broke out when hot material from the failed transformer on the power pole fell into grass.

Outcomes

Miners on the outbye side enacted their first-action response plan, and assisted their trapped colleagues. They used resources from the emergency pod until they were directed by others to leave the mine because a condition of danger had been declared relating to a surface grass fire. This meant that the trapped miners had to dig their own way out.

Participating coal mineworkers from the underground mine, the adjacent surface mine, and the surface mines rescue team demonstrated a high level of commitment and competence. They acted to improve the situation, and to manage risks. They ultimately put out the grass fire and reinstated power to the main surface fan.

The decision-making and control of the IMT and frontline leadership would have been improved by:

- better understanding of context and purpose
- analysis of the situation
- risk assessment and implementation of control measures.

The outcome was that the miners remained trapped for longer than they need have been and the best available medical attention was not provided to the injured person at the scene. Two of the trapped miners dug their own way out and began to use the emergency apparatus to remove rock from their injured colleague. Assistance eventually arrived and all three miners were aided from the mine.

The mine operator provided an effective level of support including regular communications with the media and affected family members. Aquila Mine demonstrated a mines rescue capability and the Queensland Mines Rescue Service ultimately assisted in the safe extraction of the trapped mineworkers. Its decision-making tools to evaluate whether it was safe to re-enter the mine proved effective.

Recommendations

The report makes 10 recommendations for further improvement:

Recommendation 1: That underground coal mines review their Safety and Health Mangement System to identify provisions that reduce risk and support decision-making during an emergency (resources to be provided as appropriate). Provisions could include:

- closed-circuit video cameras at strategic locations, e.g. in-pit areas of highwalls or ventilation intakes and exhausts
- reliable and relevant communication systems (e.g. surface two-way radio systems) that are made available to relevant duty-card holders
- continuous gas monitoring at strategic locations on the surface of the mine (e.g. in-pit areas of highwalls or ventilation intakes of the mine)
- handheld gas detectors for portal sentries in relevant scenarios
- suitable resources in the emergency pod
- compressed air breathing apparatus (CABA) as an alternative to self-contained self-rescuers (SCSRs) to improve verbal communication.

Recommendation 2: That mines review their first-action response plans (FARPs) to ensure they:

- take into account the time it can take for the Queensland Mines Rescue Service to mobilise underground
- provide mechanisms to keep entrapped miners informed about what is going on.

Recommendation 3: That mines physically test the controls identified in FARPs (e.g. the availability of equipment to move emergency pods to location and set props).

Recommendation 4: That underground coal mines review their procedures for dealing with the failure of the main surface fan. The mine should ensure that the ventilation system is capable of being reinstalled promptly and safely whenever power to the main surface fan fails. The SOP to enact that process should identify the availability of resources and procedure to reinstate power.

Recommendation 5: That underground coal mines review their training needs analysis for emergency first-response protocols. Practical training and assessment should ensure that mineworkers have a sound understanding of:

- first-action response plans
- the safety and health effects of mine gases
- non-verbal communication protocols
- use of airbags.

Recommendation 6: That the QMRS review the resource requirements of mines rescue substations. Improvements in planning, logistics and communication processes once on-site should be identified and provided. (Resources include such things as whiteboards, computer access, projectors, and processes to improve record-keeping associated with tracking resources including the location of its members at any time.)

Recommendation 7: That the QMRS implement an activation system that identifies the current competencies of team members against the requirements of an emergency. (Members out of 'oxygen time', for example, may not be able to go underground but can still be an appropriate resource elsewhere.)

Recommendation 8: That explosion risk zone controllers, incident management team members, control room operators and the surface mine gatehouse operators be included in scheduled training exercises (Recognised Standard 8), and have their competencies to perform in their defined roles validated. The following performance effectiveness outcomes for IMT members are relevant:

- analysing a situation, establishing the context and purpose, and managing by objectives
- developing strategies and action plans that reduce risk and make positive interventions during an emergency
- establishing priorities and issuing duty cards in accordance with the available resources and escalation processes
- summoning assistance
- identifying the need to debrief relevant personnel.

Recommendation 9: That underground coal mines ensure that their duty-card system provides for:

- prompting the person issuing the duty card to provide instruction in the context and purpose of the role depending on the scenario. (Simple work instructions aligned to the objective of the role or an explanation of the context and purpose of the role should be incorporated in the duty card. Furthermore, the person fulfilling the role of surface security, for example, should be trained to deal appropriately with a distressed family member, or be supervised in doing so.)
- prompting stakeholders to follow predefined procedures
- the call-out of resources and notification of external agencies
- the need for prompt, formal debrief of witnesses and transfer of this information to IMT and other key officials
- the number, content and point of issue of IMT and EMT (executive management team) duty cards as appropriate
- the use of available statutory emergency plans
- adequate resources to perform each role, e.g. communications, log sheets, radios, gas detectors (as appropriate).

Recommendation 10: That underground mines ensure effective procedures for identifying who is underground at any time.

Background to the exercise

The Warden's Inquiry into the coal mine explosion at the Moura No. 2 Underground Mine on 7 August 1994 recommended that emergency procedures be exercised at each mine on a systematic basis, the minimum requirement being on an annual basis for each mine.

This recommendation has been enshrined in the *Coal Mining Safety and Health Act 1999*, and the process is defined in Recognised Standard 8 — Conduct of Mine Emergency Exercises — at four levels:

- Level 1 – State Level Exercise
- Level 2 – Major Mine Site Exercise
- Level 3 – Minor Mine Site Exercises
- Level 4 – Supporting Exercises

This report relates to the Level 1 (State) exercise.

2011 Level 1 Mine Emergency Exercise

The 2011 Level 1 Mine Emergency Exercise was held at Aquila underground coal mine on Tuesday 18 October, between mid-morning and 1600 hours. The Aquila Mine is 35 km south-west of Middlemount, in Central Queensland.

Anglo American Metallurgical Coal manages several mines in the Middlemount area, including Aquila, Bundoora, Grasstree and Capcoal surface mine.

Background to Aquila Mine

Principal Hazard Management Plan (PHMP)

The Aquila Mine's Principal Hazard Management Plan (PHMP) describes an emergency as any unplanned incident that has caused, or has the potential to cause, loss of life, serious injury, severe loss of production or plant, and temporary or permanent closure of a mine, that could, if not properly controlled, escalate into a catastrophic event. The PHMP forms part of the mine's Safety and Health Management System, which deals with emergencies. The plan:

- uses risk assessment to identify potential or dangerous situations
- provides for the emergency evacuation of people from the mine to a place of safety
- provides for the aided rescue of persons from the mine
- requires mineworkers to take action to eliminate danger if they are able to
- requires mineworkers to take reasonable measures to prevent immediate danger to themselves or other mineworkers.

The objective of the Aquila Mine's PHMP is to provide an emergency preparedness and response capability that protects life and, as far as is reasonably practicable in an emergency, ensures that the risk to people is at an acceptable level.

Assumptions of Aquila Mine's PHMP

The Aquila Mine PHMP assumes that:

- the mobilisation of resources from other company mines, including Capcoal surface mine, is required. This has been previously tested as satisfactory in providing resources to support aided escape (mine rescue)
- the mine has an incident control system (ICS) and some personnel in the management structure have been trained in the system
- mine electricity, communication systems and firefighting water are provided to Aquila Mine from external and internal sources.

Mine emergency response plans

The Aquila Mine is subject to two Anglo American emergency response plans:

- the *Anglo American Corporate Emergency Preparedness and Response Plan (AAMC 9–1 Plan)* supports all mines in the Anglo group; the group's activities are based in Brisbane
- the *Capcoal Emergency Response & Management Plan Capcoal Surface Operations Plan ERMP. SO.035* covers any incident in the surface mine, and acknowledges the need to support an off-site emergency including an emergency at an underground mine.

Characteristics of Aquila Mine

Aquila Mine is an underground coal mine with workings in the Aquila coal seam. Access to the mine is via highwall entries. General characteristics and mine design are listed below.

- Travel to-and-from the mine is through the Capcoal surface mine.
- The mine's infrastructure area is several hundred metres away from the entrances to the mine workings.

- Portal entries are located at the base of a highwall (previous surface mine excavations).
- First workings are partially above a previously mined longwall area (ex-Southern Colliery workings that now form part of the Grasstree Mine). Those workings contain flammable levels of gas. The stability of the strata is also influenced when mining above previously subsided ground. Experience in those conditions has been gained.
- The Aquila seam has low in-situ seam-gas content.
- The Aquila seam has a low propensity to spontaneous combustion.
- The mining method consists of continuous miner 'cut and flit' development methods.
- Second workings may be used at the mine as a mining method, subject to a separate risk management process.
- There are two intake escapeways to the surface: a man and materials portal; and a conveyor portal. A third escapeway to the surface is via the main ventilation return but there is an airlock at the fan.
- The layout of the mine:
  - Nine roadway main headings and five headings in sub-panels
  - 80 m (approx.) rooms driven off the sub-panels.
- Underground roadways average 1.5 m high (i.e. full seam) but range from 1.4 to 1.8 m.
  - The primary escapeway (i.e. travel road) is 2.4 m high.
  - The belt road is 2.1 m high in the mains.
  - The travel road in the sub-panel is 2.1 m high.
- The roof of the conveyor and main travel roads is fully meshed.

Aquila Mine control room

The control room at the mine is several kilometres away from the main offices, at the top of the ramp to the highwall entries. Duty cards and vests are located in the control room, along with a spare cap-lamp rack and stretchers.

The control room operator (CRO) has required duties:

- to initiate external communications and the duty-card system
- to monitor progress and communicate with others
- to focus on primary roles, including the status of the monitoring system.

Mines rescue agreement

Aquila Mine has and maintains a mines rescue agreement with the Queensland Mines Rescue Service (QMRS). Aquila Mine is a part of the QMRS Mutual Assistance Group (MAG) group 2.

The QMRS is identified as an external resource in the mine's emergency management PHMP and it provides technical and supervisory experience.

There is a rescue sub-station at the administration area of Aquila Mine. It is resourced with enough equipment to enable initial response by competent rescue members and trainees. There is another sub-station at Grasstree Mine.

Control room operators in action at Aquila Mine

Scope of exercise

The exercise planned to test the assumptions in the Aquila Mine Emergency Evacuation Plan and the Emergency Management Plan.

The assumptions to be tested are listed below.

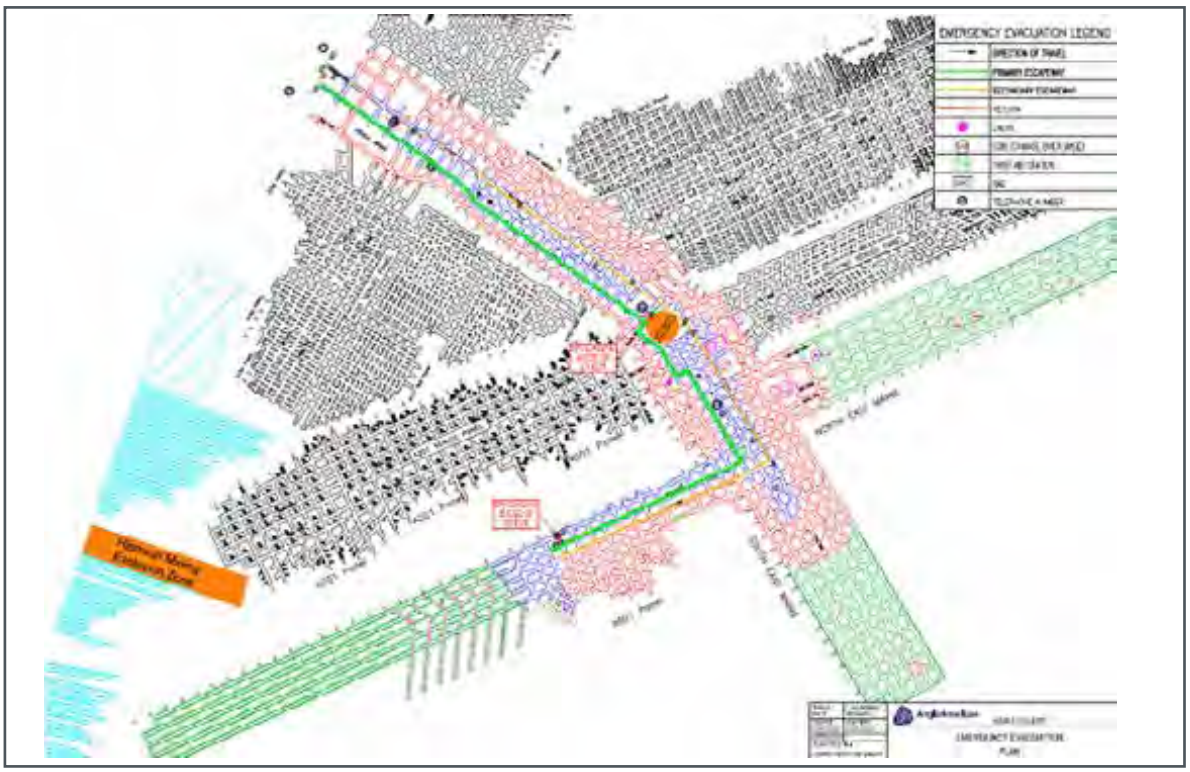
- Resources are available and will be mobilised from other Capcoal mines, including the surface mine.
- The mine has an incident control system (ICS) with trained incident management team (IMT) members.
- Mine electricity, communication systems and firefighting water are provided to Aquila–Bundoora Complex from external and internal sources.

The exercise was planned to test the effectiveness of these other aspects of the plan:

- dealing with an injured person
- donning and changeover of self-contained self-rescuers (SCSRs) if triggered
- firefighting response
- predefined strategies including evacuation of the mine following a fan failure
- use of the duty cards
- effectiveness of the IMT's decision-making and use of resources
- effectiveness of people-tracking systems
- provision for fatigue management, particularly among senior officials
- the first-action response plan (FARP) for entrapment.

The following categories of the plan were tested:

- **Activation**—informing relevant people of the situation
- **Evacuation**—arranging for those at risk to move to a safe place
- **Response**—taking remedial action
- **Incident management**—the processes and systems used to deal with the event.



Plan of Aquila Mine workings (Courtesy Anglo American Metallurgical Coal)

Scenario

The scenario for the 2011 Level 1 Mine Emergency Exercise is described below.

The exercise was based on foreseeable events. Roof-falls have occurred in Queensland underground coal mines in the past. For example, in May 2000 a roof-fall occurred at Oaky Creek No. 1 Mine, killing one worker and trapping another. A directive was issued in 2010 by the Department of Employment, Economic Development and Innovation–Mines (DEEDI–Mines) for all underground mines to provide appropriate emergency equipment (including airbags).

Cause

The emergency was a result of the continuous miner driving off-centre. Combined with geological structures in the roof, this resulted in the collapse of an underground coal pillar. The collapse of the pillar increased the effective span of roof, leading to a roof-fall at the intersection outbye of the face. The time of this event is denoted at T = 0. Other events are denoted as T + x (minutes).

Situation

T = 0

The scenario for three miners is described below:

- The roof-fall traps three miners.
- The miners are trapped in a blind-end with the continuous miner.
- Services to the continuous miner are uninterrupted. The automatic methanometer on the continuous miner is still active (it shows 0% methane gas).
- The roof and coal pillar are stable after the roof-fall; however, escape would involve scaling loose rocks and there is a risk that the lip of the fall is not supported on the outbye side.
- One of the trapped miners can see an escapeway or small opening (foxhole) to one side of the roof-fall; however, it is blocked by rocks. The miners cannot self-escape until the fallen rock is removed from around the foxhole.
- One of the miners incurs a potentially life-threatening injury: a piece of rock has fallen on his leg. He is in pain with a suspected fractured femur. The rock is too heavy to be removed with the available resources inbye of the fall—an airbag is needed.
- Toxic shock syndrome is possible if the rock is not promptly removed from the injured worker. Appropriate precautions have to be considered because there is a risk of internal bleeding. Also, there is a risk that material, if moved and not stabilised, will fall and engulf the trapped miner.
- The other two miners are not physically injured and so are in a position to help their injured colleague. Moral support, first aid within their means, and easing the weight of the rock are potential actions for these mineworkers.
- There is a possibility that a fourth miner is trapped underneath the roof-fall.
- Oxygen level is normal due to the low-gas environment.
- The trapped miners can communicate with others through the fallen rock but line-of-sight to these others cannot be established.
- Resources are able to be passed through the foxhole (e.g. SCSRs and airbags), but only if the outbye mineworkers work hard for about 30 minutes to expose the foxhole.
- The roof must be supported at the lip of the fall and rock must be removed if the miners are to gain safe passage around the roof-fall.
- The deputy (also known as an explosion risk zone controller or ERZC) and other mineworkers are on the outbye side of the roof-fall.
- The media calls the organisation's Corporate Affairs within five minutes of the first call to external emergency services via UHF radio. The media continue to call up to six times if no response is made by the company.

T + 45 minutes

- The main fan trips off when a transformer on a power pole arcs-over. There is no back-up generator for the main fan so a technical solution will be required to be developed.
- This powerline supplies the surface fan only. No other services to the underground mine are interrupted; for example, the mine's communication and gas-monitoring systems are still operating.
- Underground power trips and the belt conveyor system stops, consistent with the mine procedure.
- Back-up power supplies continue to power the gas-monitoring system and underground communication system for five hours.

T + 60 minutes

- Hot material from the failed transformer on the power pole falls into the grass and ignites a grass fire.
- Light grey smoke can be smelled and observed coming from over the highwall/endwall of the open-cut excavation (Pit G).

T + 75 minutes

- Smoke is no longer entering Pit G.
- Observers note that the fire is rapidly leaving the highwall area and moving away from Pit G.

T + 240 minutes

- Ventilation is re-established if engineers discover a technical solution

T + 360 minutes

- If an escapeway is exposed via hand-mucking, the mineworkers on the inbye are deemed to have escaped.

How the entrapment was shown in the scenario plan

Outcomes and recommendations

The outcomes of the exercise are grouped under four headings: Activation, Evacuation, Response, and Incident Management. Each outcome ends with a reference to the relevant recommendation/s.

See pages 12–13 for the full list of recomendations.

Activation

What worked?

The first response by mineworkers underground was positive and decisive.

Outbye of the fall, the response by crew members was consistent with the FARP. A mineworker contacted the CRO and the CRO called 'emergency, emergency, emergency' over the open cut two-way-radio. The CRO then contacted the surface mine gatehouse to request surface mines rescue support. The gatehouse contacted the Queensland Ambulance Service (QAS). The Open Cut Examiner (OCE) enforced radio silence, secured site access and security, liaised successfully with the surface mine gatehouse, rescue and electrical personnel, and sought advice from expert electrical staff. He provided immediate support to the proposed solution to reintroduce electrical power to the main ventilation fan.

The leadership and direction provided by the OCE was supported by the surface mine gatehouse and shift advisor who remained as point of control for communications for the duration of the emergency exercise.

Underground mine rescue team members were activated by telephone from either the Grasstree Mine CRO or by QMRS from Dysart Station.

The CRO also called control room operators at other mines by telephone, and QMRS was subsequently activated by both Aquila internal processes and QMRS processes in Dysart. All mines rescue-trained personnel who arrived at the site followed the appropriate QMRS guidelines and procedures.

An IMT formed within minutes, and the corporation in Brisbane was notified. The OCE controlled activities and ensured no untrained personnel entered the underground working.

The incident controller contacted an inspector of mines, and the Mines Inspectorate activated its call-out process and dispatched an inspector to site.

The company followed its predefined procedures on dealing with mine incidents and provided regular stakeholder updates. Those procedures and updates were deemed effective. Responses provided from company corporate officers, while measured, were prompt.

CROs acted politely and referred calls on to relevant corporate affairs and HR functions.

What could be improved?

A site-wide emergency alert was raised via the two-way radio system, and the emergency communicated across several control rooms across site. Although this was considered a tactical advantage, the standard protocols to observe radio silence and dedicate a channel to the emergency were not clear.

Radio repeaters proved unreliable during the exercise. This impeded emergency communication and hindered the efficiency of the emergency response. For example, it was noted that some of the vehicles from other Capcoal mine sites had no contact via two-way radio.

The emergency call stated that a 'rock fall' rather than a 'roof-fall' had occurred at Aquila Mine.

The surface mine rescue team responded efficiently; however, they arrived at the portal of the mine without understanding their role and how they could assist in an underground roof-fall.

An industry safety and health representative was not contacted until late in the exercise. The need to engage the Queensland Police Service (QPS) was not evaluated, and next-of-kin communication protocols were not enacted.

Responses provided from company corporate officers initially lacked detail. There was no filter (e.g. someone else to answer the phone or a line diversion) in the control room.

No-one was assigned to remain at the phone, or to extend the phone line to the incident site. There were other resources (i.e. people in offices) available; however, they were not summoned to assist.

» *SEE RECOMMENDATIONS 5, 8 AND 9 (PAGE 13).*

Evacuation

Self-escape

What worked?

The uninjured trapped mineworkers took immediate and decisive action to assess the condition of danger, and took control of the situation. They assessed the roof-fall area and identified their potential exposure to unstable strata. They sounded and scaled the roof and found they had no means of escape other than physically digging their way out.

They made contact with their rescuers by yelling through the fallen roof material, and tried to coordinate their assistance.

The entrapped mineworkers delivered high-quality first aid, within their capabilities and resources, to their injured colleague by treating him for shock and controlling the bleeding of his right leg. Their knowledge of first aid was high and they also had good knowledge of their emergency pod contents.

The trapped mineworkers informally risk assessed all their actions and discussed potential positives and negatives between themselves before doing anything.

They showed courage and leadership; for example, they instructed others to get the airbags from the emergency pod, and change over the water hose to the continuous miner to the compressed air system. Compressed air from the water hose was ultimately used to supply air to the airbags.

Meanwhile mineworkers on the outbye side of the fall were installing props to secure the lip of the roof-fall. They learned through a non-standard source of a 30 ppm CO level on the surface. SCSRs were donned and they left the workings.

The mineworkers evacuated the mine in a controlled manner.

At the crib room, the evacuating crew decided to take additional SCSRs with them. Most mineworkers chose to drive out in a diesel personnel carrier, which was appropriate; others walked out because no additional personnel carriers had been planned for.

SCSRs were successfully donned and no side-breathing was detected by assessors. Minor inefficiencies were noted in the donning procedure by some, but this was not a risk in the scenario presented. No-one attempted to talk while wearing an SCSR.

Mineworkers displayed a good understanding of the exit route and change-over base (COB). They communicated with the surface. They reported to the surface muster area on arriving at the surface.

Meanwhile, the trapped mineworkers quickly assessed that they had been left alone, and looked at options for self-escape after the outbye mineworkers evacuated. They eventually safely removed fallen rock by hand and exposed a foxhole.

They self-escaped, contacted the CRO, and were in the process of using airbags to remove fallen material from their colleague when a mines rescue team arrived to assist the injured mineworker from the mine (aided escape).

The FARP was generally followed and assisted the aided-escape effort.

What could be improved?

Better formal communications protocols should have been established with the miners inbye of the fall to keep them informed of key decisions and to understand their needs.

Non-verbal communication protocols could have been applied better to avoid delays and confusion.

No-one outbye of the fall informed miners inbye of the fall of the actions being taken to rescue them, or checked their needs.

No context or other relevant information was evaluated when making a decision to evacuate. The fire was out and CO levels were dropping rapidly. A condition of danger did not exist.

At several points, including the COB, better evaluation of the perceived condition of danger (in this case, quality of atmosphere) could have resulted in a different decision about evacuation.

» *SEE RECOMMENDATIONS 1, 2, 3, 5 AND 8 (PAGE 13).*

Aided escape

What worked?

The first miner to self-escape contacted the CRO and started to assemble the airbags to remove the rock from their injured colleague. Shortly afterwards, rescuers arrived to assist.

All three of the trapped miners were successfully extracted to the surface of the mine where the ambulance was waiting.

All underground personnel were successfully evacuated and reported to the surface muster area.

The surface mines rescue team made positive interventions that resulted in a successful extraction of an injured mineworker.

Mines rescue personnel from the QMRS arrived at the mine promptly and followed the appropriate QMRS guidelines and procedures.

The Capcoal surface mines rescue team conducted itself efficiently, taking control of the area away from the immediate area from the portal and assisted by controlling traffic, setting up extra barricades and rescue equipment. When the Capcoal surface mines rescue team learnt about the interruption to power and the surface fire, they promptly and competently attended to each.

The surface mine OCE assumed incident control on scene in accordance with Capcoal surface mine's emergency management plan. The grass fire was promptly doused, and a technical solution was promptly found to re-instate power to the main fan.

The QAS remained stationed at the portal of the mine in readiness.

A mines inspector arrived at the mine and sought relevant information from the incident controller as part of its process to provide help and advice in an emergency.

What could be improved?

After one of the entrapped mineworkers got himself to the outbye side of the roof-fall, he discovered that no-one was there.

Surface personnel were asked by the IMT to go underground to improve the communications between the IMT and underground. When they arrived underground, they were only able to offer limited assistance to the injured person, as they were not tasked to do so.

Strategies and plans could have been improved to deliver the most advanced medical assistance underground, as well as planning to bring the trapped and injured mineworkers to the surface.

It was five hours into the exercise before the mines rescue team was able to provide additional medical assistance to the injured person. Meanwhile an ambulance office was on the surface of the mine in readiness.

When members of the surface mines rescue team arrived at the portal of the mine, they did not initially understand their role or the context of the emergency. Information from those triggering the response lacked

QMRS and QAS coordination

context and purpose. (Nonetheless, the team showed leadership and deployed resources in accordance with information they received over time.)

A portal security person with a duty-card role was not in position until 67 minutes after the incident started.

There was no immediate or ongoing briefing of QMRS managers or the sub-station coordinator by the IMT. This delayed the establishment of rescue teams and their deployment underground. Regular communication would have highlighted the level of urgency required knowing that lives were at risk.

» *SEE RECOMMENDATIONS 2, 8 AND 9.*

Response

First-action response plan

What worked?

Underground mineworkers enacted the first-action response plan. They stabilised the roof outbye of the fall by carrying timber props from the crib room and setting them around the lip of the roof-fall. A brattice sail was erected in an attempt to direct any available ventilation to the fall area. A water line running through the roof-fall to the continuous miner was changed over to compressed air; however, it was not charged at that time. Mineworkers on the outbye of the roof-fall continued to provide assistance even though the main fan was off.

The QMRS took control of the situation when they arrived at the scene, displaying a high level of knowledge of first aid.

What could be improved?

Some attempt was made to communicate with the trapped miners, but it was not established what their needs were, nor were they informed of progress. No-one informed the trapped miners that their colleagues were evacuating the mine, or of the situation on the surface.

Mineworkers outbye of the fall had a discussion about the request to evacuate the mine and the source of the CO; but there was inadequate information available to them to allow them to make an informed decision. The situation, however, was not life threatening or injurious to their health.

Mineworkers outbye of the fall did not communicate their reasons for evacuation to people inbye of the fall before leaving the mine. Non-verbal communications were not effective. The deputy did not check for CO or understand the context of the emergency. Verbal communication could have been conducted at an acceptable level of risk.

Because there is no CABA (compressed air breathing apparatus) at Aquila Mine, the only form of communication from that point on was non-verbal. The non-verbal communication was not efficient.

The ERZC controller did not evaluate the safety of the environment and the consequences of the changes occurring around him and the team; for example, the impact of the loss of ventilation. Nor were disruption to power, operation of diesel machines, heat and humidity and gas levels evaluated.

» *SEE RECOMMENDATIONS 2, 8 AND 9.*

Main fan failure

What worked?

Miners outbye of the fall continued to provide aided escape to the entrapped workers even after the main fans had stopped. This was considered appropriate by the assessors in the context of Aquila Mine.

Engineers worked competently to provide a technical solution to restart the main fan. They identified the availability of an on-site power generator and safety-wired it into the main fan. The surface and underground electrical departments worked efficiently together and shared information to formulate a solution to the situation.

What could be improved?

Mineworkers chose to remain underground after the failure of the main fans. Mineworkers should have assessed the full range of hazards of staying underground when the main fan stopped operating. This may be an unacceptable level of risk in a high-gas environment. Other hazards could have also been present.

» *SEE RECOMMENDATION 8.*

Incident management

What worked?

An IMT was formed promptly when the emergency was declared, and held regular meetings during the exercise.

Portal security maintained good control in managing personnel in and out of the mine. There were discussions about the need for a personal gas detector for the portal sentry given that smoke from the surface fire entered the portal area.

The QMRS and mutual assistance was initiated and effectively engaged by the mine.

The mines rescue team acted with competence, successfully extracting the injured miner to the surface of the mine. The QAS then took over and transported the injured miner to the administration area when the exercise was declared over.

The Human Resources department attended to the physical and psychological needs of mineworkers.

What could be improved?

The IMT could have taken better control through more effective planning, organisation and leadership.

Improved communication between the IMT, frontline leadership and duty-card holders would have established the exact extent of these aspects of the emergency. There was an opportunity to monitor and review the effective implementation of documented procedures. For example, the extent of the roof-fall, progress of the recovery, the names of the trapped miners and the nature of their injuries, the number of mineworkers underground, the nature of the fire, and the support required from the surface mine.

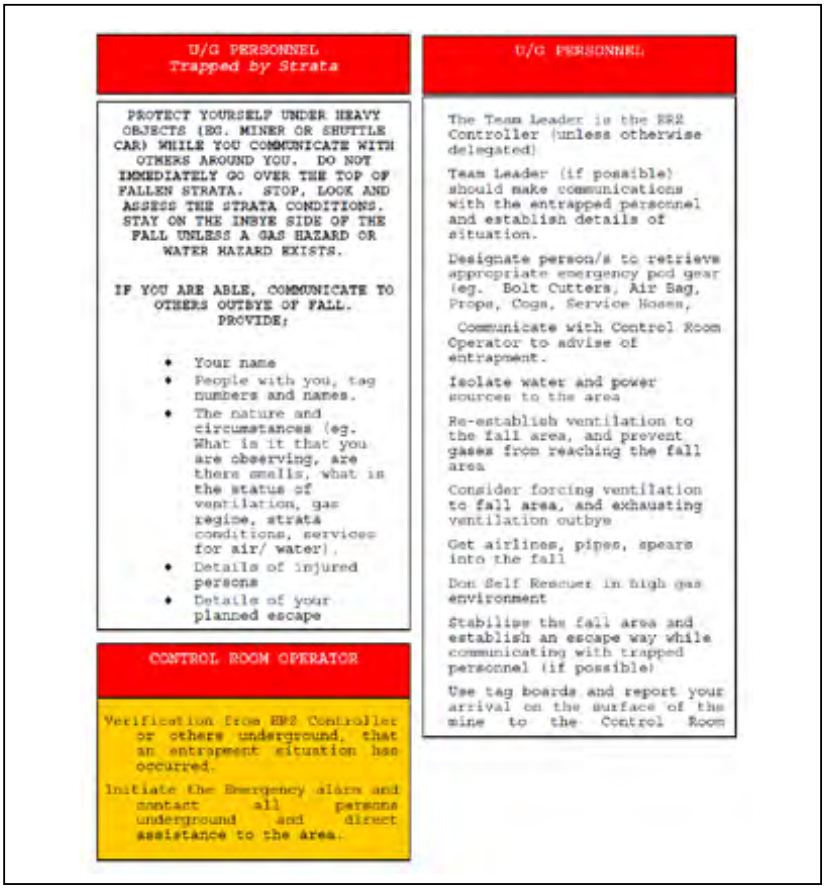
More effective intervention measures could then have been identified and actioned. The logistics of transporting mineworkers and rescue services into and out of the mine needed to be considered. Opportunities were missed to improve the collection and transfer of relevant and sometimes critical information to the IMT.

Efficient information flow would have helped stakeholders to operate more effectively and efficiently; for example, QMRS personnel reported that they had to formulate their own plans in the absence of full context.

The available resources were not fully used; for example, emergency plans, whiteboards, electronic and written dissemination of information to establish context (situational analysis) and track and coordinate resources and location of resources with standard terminology and responses. Mineworkers from other parts of the mine were not called to assist.

Better use could have been made of Aquila Mine's FARPs and documented procedures. These are available as predefined courses of action to control and manage any kind of emergency. There was an opportunity to monitor and review the effective implementation of documented procedures. The risk of causing further falls by removing rock from the trapped worker should have been evaluated.

» *SEE RECOMMENDATIONS 1, 7 AND 8.*



Example of an entrapment FARP

Duty cards

What worked?

Duty cards were initiated from the Aquila control room. Portal security was initially taken care of by a member of the Capcoal surface mines rescue team before being replaced by a portal security person with a duty card. Duty card requirements were adhered to.

A second CRO was assigned and the two CROs worked well together, sharing information

What could be improved?

Portal security could have been improved through better communications and provision of basic shelter facilities.

The IMT duty-card system was not enacted fully. There was an oppportunity for the IMT process to demonstrate management by objectives and to document and communicate action plans to other stakeholders.

» *SEE RECOMMENDATION 8.*

Locating persons underground

What could be improved?

The location of the tag board made it hard for the CRO to account for personnel underground. An over-pressure event may compromise the integrity of the tag board at the portal.

The IMT did not seek to debrief evacuating miners for relevant information. For example, there was a need to confirm who was still underground, the nature of injuries, the status of plant, the extent of the roof-fall, the nature of other environmental hazards, and the location of resources.

» *SEE RECOMMENDATION 10.*

The main fan

List of recommendations

This report makes 10 recommendations for improvement.

Recommendation 1: That underground coal mines review their Safety and Health Mangement System to identify provisions that reduce risk and support decision-making during an emergency (resources to be provided as appropriate). Provisions could include:

- closed-circuit video cameras at strategic locations, e.g. in-pit areas of highwalls or ventilation intakes and exhausts
- reliable and relevant communication systems (e.g. surface two-way radio systems) that are made available to relevant duty-card holders
- continuous gas monitoring at strategic locations on the surface of the mine (e.g. in-pit areas of highwalls or ventilation intakes of the mine)
- handheld gas detectors for portal sentries in relevant scenarios
- suitable resources in the emergency pod
- compressed air breathing apparatus (CABA) as an alternative to self-contained self-rescuers (SCSRs) to improve verbal communication.

Recommendation 2: That mines review their first-action response plans (FARPs) to ensure they:

- take into account the time it can take for the Queensland Mines Rescue Service to mobilise underground
- provide mechanisms to keep entrapped miners informed about what is going on.

Recommendation 3: That mines physically test the controls identified in FARPs (e.g. the availability of equipment to move emergency pods to location and set props).

Recommendation 4: That underground coal mines review their procedures for dealing with the failure of the main surface fan. The mine should ensure that the ventilation system is capable of being reinstalled promptly and safely whenever power to the main surface fan fails. The SOP to enact that process should identify the availability of resources and procedure to reinstate power.

Recommendation 5: That underground coal mines review their training needs analysis for emergency first-response protocols. Practical training and assessment should ensure that mineworkers have a sound understanding of:

- first-action response plans
- the safety and health effects of mine gases
- non-verbal communication protocols
- use of airbags.

Recommendation 6: That the QMRS review the resource requirements of mines rescue substations. Improvements in planning, logistics and communication processes once on-site should be identified and provided. (Resources include such things as whiteboards, computer access, projectors, and processes to improve record-keeping associated with tracking resources including the location of its members at any time.)

Recommendation 7: That the QMRS implement an activation system that identifies the current competencies of team members against the requirements of an emergency. (Members out of 'oxygen time', for example, may not be able to go underground but can still be an appropriate resource elsewhere.)

Recommendation 8: That explosion risk zone controllers, incident management team members, control room operators and the surface mine gatehouse operators be included in scheduled training exercises (Recognised Standard 8), and have their competencies to perform in their defined roles validated. The following performance effectiveness outcomes for IMT members are relevant:

- analysing a situation, establishing the context and purpose, and managing by objectives
- developing strategies and action plans that reduce risk and make positive interventions during an emergency
- establishing priorities and issuing duty cards in accordance with the available resources and escalation processes
- summoning assistance
- identifying the need to debrief relevant personnel.

Recommendation 9: That underground coal mines ensure that their duty-card system provides for:

- prompting the person issuing the duty card to provide instruction in the context and purpose of the role depending on the scenario. (Simple work instructions aligned to the objective of the role or an explanation of the context and purpose of the role should be incorporated in the duty card. Furthermore, the person fulfilling the role of surface security, for example, should be trained to deal appropriately with a distressed family member, or be supervised in doing so.)
- prompting stakeholders to follow predefined procedures
- the call-out of resources and notification of external agencies

- the need for prompt, formal debrief of witnesses and transfer of this information to IMT and other key officials
- the number, content and point of issue of IMT and EMT (executive management team) duty cards as appropriate
- the use of available statutory emergency plans
- adequate resources to perform each role, e.g. communications, log sheets, radios, gas detectors (as appropriate).

Recommendation 10: That underground mines ensure effective procedures for identifying who is underground at any time.

The IMT administers duty cards

Bringing the injured miner to the surface

Considerations for future exercises

The basis for mine exercises are the provisions in Section 35 of the Coal Mining Safety and Health Regulation 2001 (General) (see Appendix 6).

These comments are provided for future exercise committees for both the Level 1 (Statewide) and Level 2 (Minesite) exercises and are based on the Regulation.

Emergency events in most cases are foreseeable.

Such events are required to be analysed in the Safety and Health Management System (SHMS) and appropriate controls and risk mitigation strategies are to be in place to prevent those events happening or to minimise the impacts. It is not necessary to devise an unrealistic scenario. The 2011 scenario was based on foreseeable events that were mostly identified within the mine's SHMS.

If deficiencies are discovered in a mine's SHMS while the exercise is being planned or implemented, the SSE should be informed.

Response to surface fire and surface mine support

Appendix 1: Level 1 exercises

As set out in Recognised Standard 8, the objectives of the level 1 emergency exercises are:

- safely test the facilities and strategies in place at a mine to manage emergency events in all circumstances
- test the competency of mineworkers in using those facilities and implementing the strategies
- enhance the confidence and ability of mineworkers to respond in an emergency
- identify opportunities for improvement
- share the learning outcomes with industry.

The objectives are further defined in the standard as:

- to test the mine's emergency response system
- to test the ability of external services to administer assistance
- to provide a focal point for emergency preparedness in the State.

To this end, the scope of the exercise will include testing these aspects:

- Mine response to the scenario presented, testing self-escape/aided escape and in-seam response as required.
- Mobilisation of Queensland Mines Rescue Service and other external services, including Mines Inspectorate, industry safety and health representatives, Simtars, Queensland Police Service, and Queensland Ambulance Service to the extent required by the exercise scenario.

Queensland Mines Rescue Service will be expected to:

- provide the rescue team response as defined in the MRA (Mines Rescue Agreement) with the mine
- deploy rescue teams underground including the establishment of a fresh-air base (if required) in response to the scenario.

Using an airbag to rescue the injured mineworker

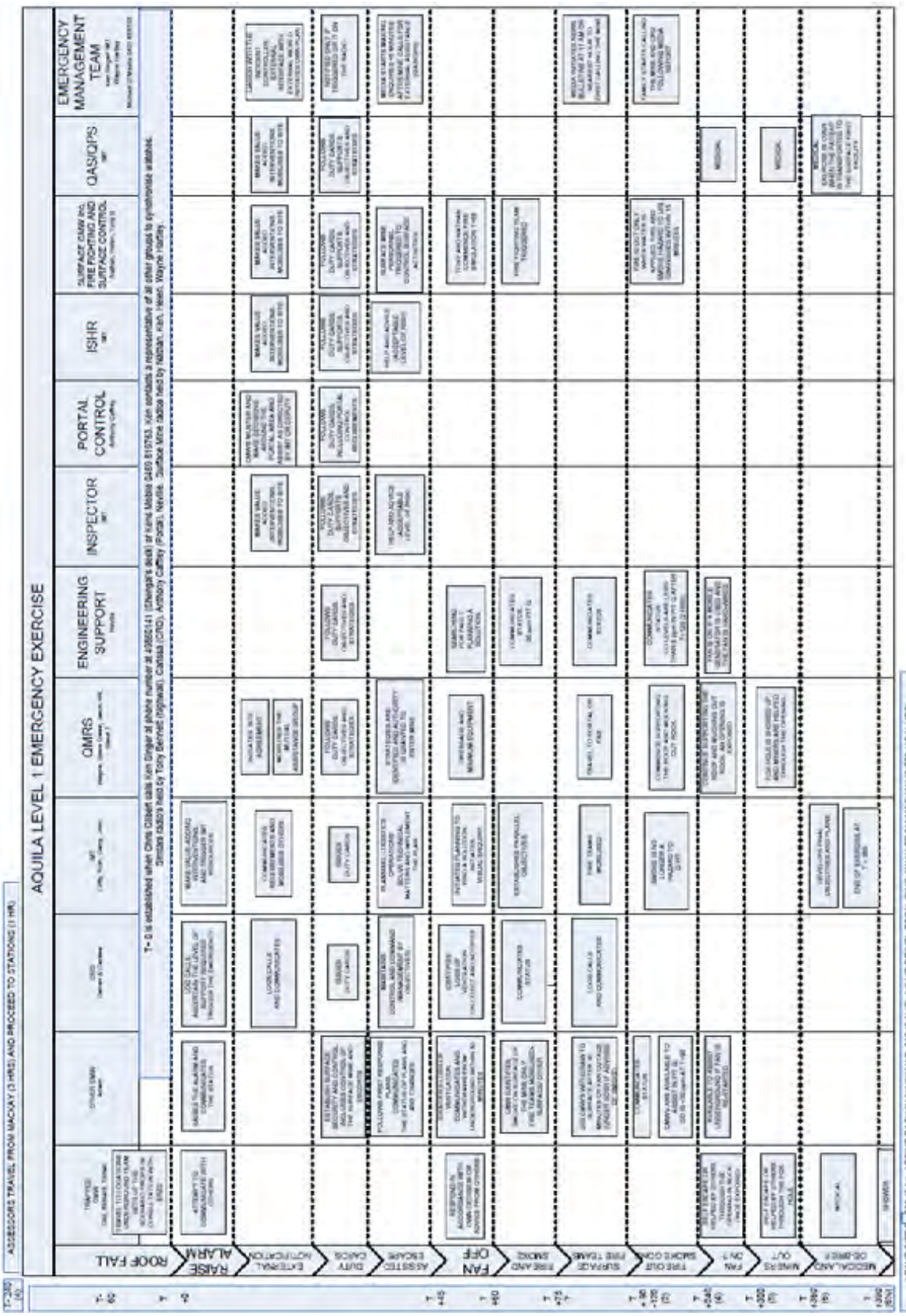
Appendix 2: Exercise timeline and coordination

Time	Observation
1020	Start of exercise—the roof-fall scenario is enacted: T = 0.
1025	CRO alerted to roof-fall by underground operator at crib room.
1028	CRO declares an emergency.
1030	CRO calls 000 (simulated) and requests ambulance assistance.
1030	Deputy arrives at fall and sends CMWs to get props.
1032	Ventilation Officer receives a phone call from the CRO informing of the roof-fall
1033	Aquila CRO phones Grasstree CRO for mines rescue assistance. Issues Non-Affected Mine duty card to Grasstree CRO.
1035	Aquila CRO calls Bundoora CRO and asks Bundoora CRO to monitor gases while exercise is on.
1035	UMM declared an emergency and requests IMT to be formed at 1040 hrs.
1036	CRO asks fitter to pit sentry. Initiates Sentry duty card.
1037	ICT formed
1038	UMM delegated Project Manager to be IMT Operations Coordinator. Mechanical engineer to Logistics Coordinator.
1045	Started to stand props working way into the fall area.
1045	Ambulance arrives on site.
1050	The trapped CMWs discuss using the water hose miner on the continuous miner as an air hose for the air supply to the airbags.
1050	A person sent over to act as Aquila site security. Gates locked.
1053	ICT rings DEEDI inspectorate emergency number.
1055	Ambulance turns up at portal. Security person asked if ambulance may enter.
1056	ICT rings Corporate HQ.
1058	Loader arrives in panel with large props.
1058	Ambulance in pit to portal.
1059	Surface mines rescue member arrives at the portal area: firefighting capability at the portal checked — found water present and was satisfied with the capabilities; no duty cards or any other resources. Transport vehicle is chocked.
1105	Assessor informs deputy and operators at fall site that there is no ventilation.
1107	Deputy speaks to CRO about fans being off—deputy comfortable with staying underground with no ventilation.
1108	First mines rescue member arrives from Grasstree.
1115	Gate at the portal entry provides further security. Sentry also advises CRO that fan and conveyor belt have stopped.
1117	ACRO makes decision that he can get underground to administer first aid faster than the ambulance officer can be transported underground. He changes out his duty card as ACRO and the vest is given to a surface supervisor.
1120	A single person at the portal claiming to be 'advance rescue' goes underground and assists with the injured person. Surface mines rescue member who is portal security informs this person that there is no ventilation or power. Person places tag on the tag board and progresses underground with only a SCSR on person.
1126	Fire starts — visible smoke entering the surface in-pit area; surface mines rescue member conducting portal security informs CRO that there is visible smoke coming into the pit from on top of the highwall in the area above the fans. He describes the amount of smoke coming into the pit.

Time	Observation
1127	CRO receives notification that there is a fire on top of the portal at the highwall, and that CO levels are rising.
1128	Deputy Chief Inspector of Mines receives phone call from Chief Inspector of Coal Mines advising of the incident.
1129	CRO requests non-essential personnel evacuate the mine.
1130	ACRO receives call from deputy and passes phone to CRO. CRO advises deputy that everyone to don SCSRs, and advises they are switching to non-verbal communications. CRO then takes ACRO through the non-verbal communications process: 3 beeps for yes, 2 beeps for no.
1133	CMW underground informs the group of message from CRO about 30 ppm CO; group told to evacuate mine and put on SCSRs.
1135	Crew discusses whether to put on the SCSRs and evacuate or stay and continue with fall-recovery efforts.
1140	Crew decides to don SCSRs and use non-verbal communications. There is some debate over whether to leave the underground; however, the nature and status of the CO could not be established.
1141	CRO advises ACRO that a CMW at the portal just advised 15 ppm CO gas level.
1141	Underground crew walk out to the underground crib room and access more SCSRs from the crib room cache; unsuccessful verbal communications on DAC at crib room.
1144	Trapped CMWs realise CMWs on the outbye of the fall have evacuated.
1148	The fire on end wall is brought under control (put out) and assumes road control.
1159	QMRS trailer arrives on site; open-cut paramedic arrives to assist.
1200	IMT decides to dispatch Operations Coordinator with the purpose of improving communications between IMT and underground
1200	Evacuating CMWs arrive at the COB. Lively discussion by crew about going back to roof-fall and continuing the recovery. Advice from surface CRO is to continue heading out of the mine and report to CRO area.
1207	QMRS arrives on site.
1209	Hire generator (350 KVA) identified at German Creek surface mine, available at portal within 2 hours.
1210	Operations Coordinator rings COB — engaged Incident Controller to ring afternoon shift deputy to come in early. CMWs from Bundoora Colliery arrive at the Aquila administration complex containing: 2 electricians, 2 fitters, 1 miner, 1 ERZ controller. Operations Coordinator confirms with CMWs that they are not inducted for Aquila and request men to wait in muster area.
1215	Evacuating CMWs continue travelling out of the mine to the surface in a personnel carrier (Driftrunner).
1220	Evacuating CMWs now out of the mine. Crew assembles outside CRO area.
1221	Portable gas detectors arrive at the portal; portal security takes gas level (CO 5 ppm) and informs CRO.
1230	Wife of trapped CMW arrives at site and is taken into admin area for briefing.
1232	QAS from Middlemont Station arrives at portal.
1304	Deputy who had evacuated from the mine sepaks to IMT by telephone and passes on some brief information.
1320	Mines Rescue Team members briefed.
1340	Company Corporate office (Brisbane) informs Mines Inspectorate that executives are flying to site. Press conference is planned for 1430 in Brisbane.
1351	Four persons arrive at portal to go underground to perform reconnaissance. Portal security asks if they have authority to go underground, which they state they have from the UMM. These personnel contact CRO to gain permission again for entry without fan being on. Three persons enter underground and leave one of the miners at the portal with instructions to bring in the QMRS team when they arrive. Tags are placed on the tag board and names are taken by portal security.
1354	Light vehicle arrives at administration offices to transport first mines rescue team to portal.

Time	Observation
1410	Approval granted for QMRS to enter underground; starts to walk underground.
1418	Trapped CMWs continue to remove rock, revealing an escapeway in the rock (foxhole on left-hand side of fall, near rib). Risk is assessed (sounding and scaling). Safe passage is realised, and one of the trapped CMWs crawls through escapeway with a plan to get airbags and trauma kit for injured CMW.
1420	CMW who self-escaped from the fall contacts CRO by DAC. Seeks assistance.
1425	CMW returns inbye of the fall with airbags and trauma kit. CMWs set up airbags and prepare to lift a large rock off the injured person after assessing the injured CMW's ability to feel and move his toes and both his legs.
1427	Three more CMWs enter through the foxhole unannounced (one is the Operations Coordinator). These men are named AMW 1,2,3 (additional mineworker 1,2,3).
1430	A technical solution is found for the main surface fan, and the Ventilation Officer grants permission to start the fan.
1430	Company Corporate hold a press conference in Brisbane.
1433	QMRS enters mine portal with Team 1, QMRS Manager, geotechnical engineer and Site Deputy. FAB Controller stays on surface at portal with all FAB gear.
1435	Mines Inspector arrives on site, and confers with the UMM (Incident Controller/SSE).
1440	Ventilation fan is restored.
1450	QMRS Team 1 arrive at the roof-fall and enter through foxhole.
1450	QMRS — full medical assessment of the trapped CMWs, wet and bulb readings, checking for gas, set extra props on lip of fall to further protect the patient.
1508	QMRS uses airbag to free the injured CMW. Paramedic treats patient with oxygen and medication.
1520	Injured CMW is placed on a stretcher and dragged through foxhole out of fall area, and carried to the crib room.
1535	Driftrunner arrives at the crib room and patient is transferred into the back of the vehicle for transport to the surface.
1543	Casualty arrives at the portal in Driftrunner on a stretcher, and transferred to the surface ambulance.
1545	Mines rescue teams exit mine.
1600	Company media release states that all CMWs have been brought to surface and receiving medical attention.
1614	Company head of operations sends a message to all staff to inform them of the day's events and that the three trapped CMWs are on the surface and receiving medical attention.
1616	Injured CMW arrives at Aquila Mine main complex. Exercise is declared over.
1630	Debrief.

Appendix 2: Exercise coordination matrix



Appendix 3: Mine record entry prior to exercise

Queensland Government

Department of Employment, Economic Development and Innovation
Brisbane - Head Office
P.O. Box 15216, CITY EAST QLD 4002
Phone: (07) 3237 1474, Fax: (07) 3237 1242

Mine/Quarry Name	File #	Operator	Activity Type	Region	Activity Date
Capcoal Surface Coal Mine (Ex German Creek)	1,772	Anglo Coal (Capcoal Management) Pty Ltd	Emergency Exercise	Central	10/10/2011

Vision: Our Industries Free of Safety and Health Incidents

Mine Record Entry

This report forms part of the Mine Record under s68 of the Coal Mining Safety and Health Act 1999. It must be placed in the Mine Record and displayed on Safety Notice Boards.

Site Safety & Health Reps Consulted: Peter Oram (Capcoal Surface Mine), Mick Stothard (Aquila mine)

Emergencies s35 General
Coal Mining Safety and Health Regulation 2001

Summary

- The purpose of this Mine Record Entry is to notify coal mine workers of the 2011 Queensland Coal Mines State Wide Emergency Exercise (Level 1).
- The exercise is scheduled to occur at Aquila Underground Mine within 2 weeks (between 11/10/11-24/10/11).
- Personnel involved in the exercise may be required to travel to-and-from Aquila mine via the Capcoal surface mine. This is an important interface that needs to be managed.
- An objective of this communication is to;

a. Ensure that no person is injured or equipment damaged during the exercise.

b. Avoid any community alarm or apprehension.

- The site senior executive is requested to provide the details of this Mine Record Entry to the affected coal mine workers.

Background

- The Warden's inquiry into the coal mine explosion at the Moura No. 2 Underground Mine on 7 August 1994, recommended that

"*Emergency procedures should be exercised at each mine on a systematic basis the minimum requirement being on an annual basis for each mine*" (Windridge et al, 1996).

- The first such exercise was held at Southern Colliery in October 1998. The outcomes of this and subsequent exercises have been disseminated to industry.

- Emergency Exercises are conducted in accordance with Recognised Standard 08 (Conduct of mine emergency exercises, Coal Mining Safety and Health Act 1999).

- Members of the organising committee visited Aquila mine on 28/6/11 and 16/8/11. The purpose of those visits was to assist the committee to plan the exercise. Those teams also travelled to relevant parts of the Capcoal surface coal mine.

- Further planning meetings were conducted which included a risk assessment with involvement from coal mine workers from Aquila mine and the Capcoal surface coal mine.

Objectives of the Exercise (Level 1)

The emergency exercise is conducted in a manner to –

- Ensure no personnel injury, equipment damage or introduction of additional risks. Note: Design of the emergency exercises must be done using risk assessment methods.
- Test the ability of the current Mine Emergency Procedures Plan to meet the desired outcomes of an emergency response.
- Relate to the principle hazards identified as being integral to the mine itself and ensure the facilities to control are adequate.
- Demonstrate a coordinated response.
- Assess all the elements and personnel involved and identify any additional training needs.
- Avoid any community alarm / apprehension.
- Enhance the confidence and ability to respond to an emergency.
- Allow for a performance analysis and debrief to occur with outcomes recorded and relevant information disseminated internally and to the industry.
- To test the ability of external agencies to respond to an emergency.

Risk Management

The following controls are relevant;

- External support agencies will be informed of the impending exercise. Their potential involvement in the exercise must not be allowed to impact their ability to respond to a real emergency.

- Mine site briefings and notification of the exercise be provided to coal mine workers and contractors (a Mine Record Entry is available).
- Additional controls are to be in place if evacuating teams have impaired-visibility during any potential evacuation.
- Additional self-contained self rescuers will be made available if the scenario requires the donning of self rescuers. Coal mine workers are not to use their allocated belt worn or cached self-contained- self rescuers unless required in the case of a real emergency.
- Surface and underground vehicular movement needs to be controlled and managed in accordance with established site protocols.
- Tag board protocols need to be observed (even for assessors).
- Personnel in the company of assessors will be asked to make the work-area safe prior to commencing exercise activities.
- Assessors may require coal mine workers to identify their planned activity, and to discuss the identified hazard and planned controls.
- The exercise will not involve any actual disconnection of electricity or other services, unless deemed appropriate by those involved in the exercise including the potential need to consult with responsible statutory official(s), as the case may be.
- Statutory inspections as required by the mine inspection scheme are to be maintained.
- Video camera(s) maybe used during the exercise. Appropriate site procedures and authority is required.
- Assessors and coal mine workers will comply with site procedures and policies. Any potential deviations must be discussed with assessors who will respond "*noted* ". Assessors can not authorise breaches of the rules or other potential actions which may be allowed under emergency provisions of the legislation.
- Assessors will follow protocols for notifying the relevant open cut examiner (OCE) and explosion risk zone controllers (ERZC) of the planned activity prior to the exercise commencing.
- All messages during the exercise should be preceded with "*this is an exercise* " or words to that effect.
- At the completion of the exercise, any used emergency equipment should re-stocked. The exercise committee has identified some resources, and arrangements have been made to ensure that additional supplies are available at the completion of the exercise.
- The exercise will be cancelled or suspended if a real emergency occurs during the exercise. Any person has the obligation to trigger a real emergency as per site requirements.
- If a real emergency occurs, or if coal mine workers have not been informed that it is part of the exercise, the following announcement will be made "*This is not an exercise*".
- The exercise shall not continue, or it shall remain cancelled, unless otherwise approved by the site senior executive(s) after appropriate consultation with relevant stakeholders.
- Additional drinking water shall be made available at the sites manned by the assessors.

- Two assessors have been made available from Capcoal surface coal mine. They will assist in risk management of surface activities.

Conclusion

The Level 1 Emergency Exercise is an opportunity for coal mine workers to practice the mine's emergency response strategies and procedures. Within 2 days of the exercise, some members of the organising committee will travel back to site, to provide feedback and an opportunity for de-briefing.

Should any person have any concerns about the exercise, please communicate via the normal reporting channels. If necessary, please contact Ken Singer on 0459 819763.

Ken Singer

Inspector of Mines
Southern Region

Appendix 4: Mine record entry after the exercise

Department of Employment, Economic Development and Innovation
Brisbane - Head Office
P.O. Box 15216, CITY EAST QLD 4002
Phone: (07) 3237 1474, Fax: (07) 3237 1242

Mine/Quarry Name	File #	Operator	Activity Type	Region	Activity Date
Aquila Mine	33724	Anglo Coal (Capcoal Management) Pty Ltd	Emergency Exercise	Central	03/11/2011

Vision: Our Industries Free of Safety and Health Incidents

Mine Record Entry

This report forms part of the Mine Record under s68 of the Coal Mining Safety and Health Act 1999. It must be placed in the Mine Record and displayed on Safety Notice Boards.

Note that inspection or audit activities conducted by the Mines Inspectorate are based upon sample techniques. It remains the primary responsibility of Mine Personnel to identify hazards, and risks associated with Operations and ensure those risks are at an acceptable level.

Site Safety & Health Reps Consulted: No

Coal Mining Safety and Health Act 1999 (CMSHA) and Coal Mining Safety and Health Regulation 2001 (CMSHR)

Level 1 Exercise Aquila Mine (18 October 2011).

Today I attended the Aquila Mine where I presented a *Power Point* presentation to coal mine workers at the scheduled safety meeting. The presentation gave an overview of the Level 1 emergency exercise which was conducted at the mine on 18 October 2011.

The final report is being prepared, and will be made available in the new year 2012.

On behalf of the Level 1 organising committee I thank all coal mine workers and others who participated in the exercise. It is noted that coal mine workers participated in the exercise with commitment, and have already initiated several improvement initiatives ahead of the formal report.

Prior to the safety meeting I met with Mr Mike Downs (Site Senior Executive and Underground Mine Manager). Mr Downs brought to my attention the following actions that he and others had initiated in response to their own review of the exercise;

1. A communication cable and DAC was provided as a resource in the emergency pod. This will allow communications to be readily extended to parts of the mine in particular the site of an incident.
2. Larger diameter props will be sourced for the emergency pod to assist in supporting the roof during a roof fall.
3. A compressed air powered chain saw will be placed in the emergency pod.
4. A series of Level 4 (desk top/semi practicable) exercises will be arranged for the

Incident Management Team (IMT) with Mr Downs as the IMT incident coordinator. The objectives of the exercises are to provide further theoretical and practical training in IMT functions as identified in the Emergency Response PHMP.

5. Each ERZ Controller at the mine will participate in an exercise(s) as a part of refresher training and as a process to re-assess their competency against the coal industry unit of competency for *Respond to Local Emergencies and Incidents* in accordance with the role of ERZ Controllers at the mine.

6. The SSE is reviewing the training-needs-analysis and appointment process of ERZ controllers at the mine.

Mr Downs advised me that an incident report will be completed as a pro-active measure to record the improvement actions and to track closure of the actions.

Ken Singer

Lead Auditor
Inspector of Mines
Southern Region

Appendix 6: Extract from Coal Mining Safety and Health Regulation 2001 (General)

Section 35 of the Coal Mining Safety and Health Regulation 2001 (General) states:

(1) A coal mine's safety and health management system must provide for managing emergencies at the mine.

(2) The system must include provision for the following —

(a) identifying, by risk assessment, potential emergency situations;

(b) minimising risks associated with potential emergency situations;

(c) carrying out aided rescue and self-escape of persons from the mine in an emergency;

(d) carrying out emergency exercises, including testing the effectiveness of emergency management procedures and the readiness and fitness of equipment for use in an emergency;

(e) auditing and reviewing the emergency exercises;

(f) if the mine is a surface mine—involving an open-cut examiner for the mine in—

(i) developing and testing the emergency management procedures for activities, including mining activities, in and around the surface excavation; and

(ii) auditing the documentation for the procedures;

(g) if the mine is an underground mine—involving an ERZ controller for the mine in—

(i) developing and testing the emergency management procedures for explosion risk zones; and

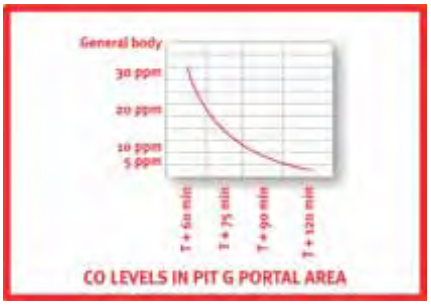
(ii) auditing the documentation for the procedures.

Appendix 5: Information given to mineworkers

GAS MONITORING AND COMMUNICATION SYSTEMS ARE NOT IMPAIRED

BELT

STOPPED



CO LEVELS IN PIT G PORTAL AREA

CO _ _ _ _ PPM

THE VENTILATION FAN HAS STOPPED

YOU CAN SMELL AND SEE LIGHT GREY SMOKE COMING FROM THE HIGH WALL / END WALL AREA

THERE IS NO MAINS POWER

NO

POWER

NO

VENTILATION

_ _ _ °C WET BULB

_ _ _ °C DRY BULB

YOU CAN SMELL SMOKE

13 25 23
www.mines.industry.qld.gov.au

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Queensland Government